Labor Market Power, Tax Progressivity and Inequality

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Three views on optimal income tax progressivity

Heathcote Storesletten Violante (2020)

- Idiosyncratic worker productivity risk in Bewley economy

  → Higher progressivity provides insurance ✓

Scheuer Werning (2017)

- Sorting of high productivity workers into high productivity matches

  → Higher progressivity reduces sorting ✗

Berger Herkenhoff Mongey Mousavi (2024)

- Monopsonistically competitive firms

  → Higher progressivity reduces firms' labor supply elasticity ✗

Questions

Main question

- How does market power in labor markets affect optimal income tax policy?

Also ...

- What is the effect of changes in market structure on wage, consumption inequality?
- How do shocks to firms pass-through to consumption across the wealth / income distribution?

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Necessary features

- Rich firm heterogeneity, concentrated markets, imperfect competition (BHM, 2022)
* Rich household heterogeneity, consumption, savings, labor supply (e.g. HSV, 2020)

Today

1. Theory

- Incomplete markets (Bewley (1977)) + Intensive margin supply (Macurdy (1981)) + Extensive margin supply (Card et al (2020)) + Oligopsony (BHM (2022))
- How labor supply elasticities, sorting determined by wealth inequality, taxes, market power

2. Quantitative

- Simplified model - Static, Heterogeneous firms / workers, Homogeneous markets
- Calibration - Match recent decompositions of wages into firm / worker effects + covariance
- Result 1 - Match empirical markdowns by worker / firm types and MPE's by income
- Result 2 - Wealth effects as important as market-share in determining markdowns
- Result 3 - Increasing progressivity decreases inequality, but decreases output

Environment

Firms - Labor markets $m \in \{1, \ldots, M\}$. Firm $j \in \{1, \ldots, J_m\}$. Productivity $z_{jm} \sim \Gamma_z(z)$

$$rev_{jmt} = y_{jmt}^{\alpha} \quad , \quad y_{jmt} = \int A\left(z_{jm}, e_t^i\right) n_{jmt}^i \, di \quad , \quad n_{jmt}^i = \gamma\left(a^i, e^i\right) \rho_{jmt}^i \, h_{jmt}^i$$

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Households - Continuum of workers, $i \in [0, 1]$, paid w_{jmt}^i per hour h_{jmt}^i

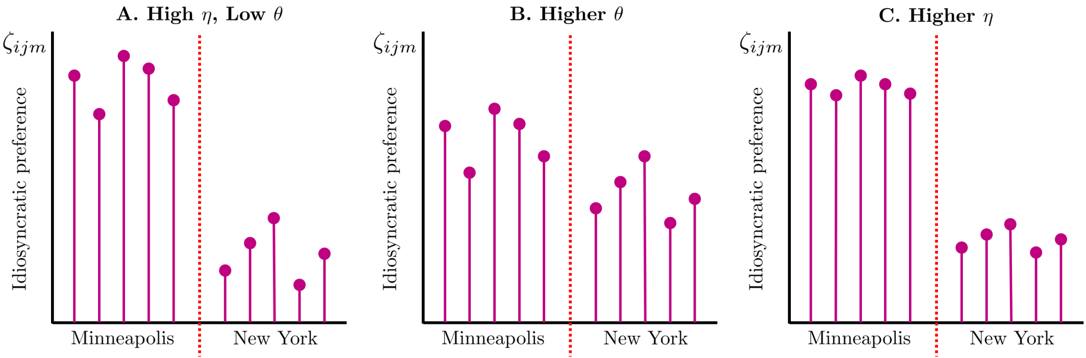
- Stochastic productivity e_t^i: $\quad e_{t+1}^i \sim \Gamma_e(e|e_t^i)$
- Each period decide market m and firm j to work at

$$\mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t u_{jmt}^i \right] \quad , \quad u_{jmt}^i = \underbrace{\frac{c_{jmt}^{i\;1-\sigma}}{1-\sigma}}_{\text{Consumption}} - \underbrace{\frac{1}{\varphi^{1/\varphi}} \frac{h_{jmt}^{i\;1+1/\varphi}}{1+1/\varphi} + \zeta_{jmt}^i}_{\text{Labor supply}} \quad , \quad \underbrace{\zeta_t^i \sim \Gamma_\zeta(\zeta)}_{\text{iid each period}}$$

- Save in government debt, interest rate r, borrowing constraint $a_{t+1}^i \geq \underline{a}$.

Environment - Preferences - Nested Gumbel

$$\Gamma_{\zeta}(\boldsymbol{\zeta}) = \prod_{m \in \mathcal{M}} \exp\left\{ - \left(\sum_{j \in m} e^{-\eta \zeta_{jm}} \right)^{\theta/\eta} \right\}$$



Environment - Nested models

- Lamadon, Mogstad, Setzler (AER, 2022)
  - *Imperfect Competition and Rent Sharing in the U.S. Labor Market*
  - No savings, Log utility $(\sigma = 1)$, No hours margin $h^i_{jmt} = 1$, Monopsony $J_m \to \infty$
- Heathcote, Storesletten Violante (QJE, 2017)
  - *Optimal Tax Progressivity: An Analytical Framework*
  - Competitive firms, No complementarities $A(z_{jm}, e^i) = Ze^i$, $w^i_{jmt} = W_t e^i_t$
- Berger, Herkenhoff, Mongey (AER, 2022)
  - *Labor Market Power*
  - No idiosyncratic risk, log utility $(\sigma = 1)$

Household problem

1. Choice over employers j and markets m, given wages w_{jm}

$$\widetilde{V}\left(a, e\right) := \mathbb{E}_{\zeta}\left[\max_{j,m}\left\{V\left(a, e, w_{jm}\right) + \zeta_{jm}\right\}\right]$$

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$$\widetilde{V}\left(a, e\right) = \frac{1}{\theta} \log \left[\sum_{m} e^{\theta \overline{V}(a,e,\mathbf{w}_m)} \right]$$

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2. Consumption, savings, hours decision, given, w, r, Π

$$\begin{aligned} V\Big(a,e,w\Big) &= \max_{a',c,h} u\big(c,h\big) + \beta\int \widetilde{V}\Big(a',e'\Big)\, d\Gamma_e\big(e'|e\big) \\ c + a' &= \Big(1-\tau_0\Big)\Big(whe\Big)^{1-\tau_1} + (1+r)a + \Pi \\ a' &\geq \underline{a} \end{aligned}$$

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Firm problem

Problem - Given $\mathbf{w}_{-jm}(e)$ and *aggregates, S*, choose wages $w_{jm}(e^i)$ to maximize profits

$$\max_{\{w^i_{jm}\}} \quad \left(\int_E A^i_{jm} n^i_{jm} d\Gamma(e^i)\right)^{\alpha} - \int_E w^i_{jm} n^i_{jm}\, d\Gamma(e^i)$$

$$\text{s.t.} \quad n^i_{jm} = \int_A \rho^i_{jm} h^i_{jm}\, d\Gamma(a^i | e^i)$$

Optimality / Nash - Standard markdown condition for each worker skill e^i

$$w^{i\,*}_{jm} = \underbrace{\frac{\varepsilon^i_{jm}}{\varepsilon^i_{jm}+1}}_{\text{Markdown}} \quad \underbrace{\alpha y^{\alpha-1}_{jm} A^i_{jm}}_{\text{Marginal revenue product}} \quad , \quad \varepsilon^i_{jm} := \left.\frac{\partial \log n^i_{jm}}{\partial \log w^i_{jm}}\right|_{\mathbf{w}^{i\,*}_{-jm}}$$

1. Elasticity of labor supply - ε_j

Firm-Worker labor supply elasticity

$$n^i_j = \int \rho^i_j h^i_j \, d\Gamma(a^i | e^i)$$

$$\varepsilon^i_j = \int \underbrace{\frac{\rho^i_j h^i_j}{n^i_j}}_{\text{Share of } e^i \text{ labor of type } a^i} \times \left[\varepsilon^i_{\rho,j} + \varepsilon^i_{h,j} \right] d\Gamma(a^i | e^i)$$

Extensive margin elasticity

$$\varepsilon^i_{\rho,j} = \frac{\partial \log \rho^i_j}{\partial \log w^i_j}$$

Intensive margin elasticity

$$\varepsilon^i_{h,j} = \frac{\partial \log h^i_j}{\partial \log w^i_j}$$

1. Elasticity of labor supply - $\varepsilon^i_{\rho,j}$ - Extensive margin

$$\rho^i_j = \left(\frac{e^{V^i_j}}{e^{\widetilde{V}^i_j}}\right)^{\eta}\left(\frac{e^{\widetilde{V}^i_j}}{e^{\overline{V}^i}}\right)^{\theta}$$

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2. Larger firm in the market $\uparrow \rho^i_{j|m}$, Less elastic (BHM, 2022)

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2. Larger firm in the market $\uparrow \rho^i_{j|m}$, Less elastic (BHM, 2022)
3. Poorer households $\uparrow V^i_a$, Higher marginal value of a dollar, More elastic

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5. Higher progressivity $\uparrow \tau_1$, Competitor's higher offer is taxed away, Less elastic

1. Elasticity of labor supply - $\varepsilon^i_{h,j}$ - Intensive margin

$$\varepsilon^i_{h,j} = \frac{\partial \log h^i_j}{\partial \log w_j}$$

$$\varepsilon^i_{h,j} = \frac{\left(1 - \sigma \frac{\partial \log c^i}{\partial \log \widetilde{y}^i}\right)\left(1-\tau_1\right)}{\left(1+1/\varphi\right) - \left(1 - \sigma \frac{\partial \log c^i}{\partial \log \widetilde{y}^i}\right)\left(1-\tau_1\right)} \quad , \quad \frac{\partial \log c^i_j}{\partial \log \widetilde{y}^i_j} = \frac{\{dc^i / db^i\}}{\{c^i / \widetilde{y}^i\}} = \frac{mpc_i}{apc_i}$$

- Progressivity - More progressivity $\uparrow \tau_1$, Additional hour taxed more, Less elastic $\downarrow \varepsilon_h$
- MPC - Get $1, spend it, negative wealth effect. Higher if spend more. Less elastic $\downarrow \varepsilon_h$

Result - *On both the extensive, and intensive margins, the partial equilibrium effect of higher tax progressivity is a lower labor supply elasticity*

2. Sorting

- Worker skill: $e^L > e^H$
- Firm productivity: $z_1 > z_2$
- Budget constraint: $c^i = w_j^i h_j^i$.
- Extensive margin elasticity:

$$\varepsilon_j^{\rho,i} = \left(\theta\rho_j^i + \eta(1-\rho_j^i)\right) y_j^{i\,-(\sigma-1)}$$

- Production: CRS $\alpha = 1$

$$y_j = \sum_i A_j^i \rho_j^i h_j^i \quad , \quad \underbrace{A_j^i = z_j e^i \exp\left\{-\frac{\psi}{2}\left(\tilde{z}_j - \tilde{e}^i\right)^2\right\}}_{\psi=0 \;\Leftrightarrow\; A_j^i = z_j e^i}$$

2. Sorting

- Definition: x is *log super-modular* if σ_x is positive, where σ_x is

$$\sigma_x = \log\left(\frac{x_1^H / x_2^H}{x_1^L / x_2^L}\right)$$

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- Applied to A_j^i

$$\sigma_A = \psi\left(\widetilde{z}_1 - \widetilde{z}_2\right)\left(\widetilde{e}^H - \widetilde{e}^L\right)$$

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- Applied to A_j^i

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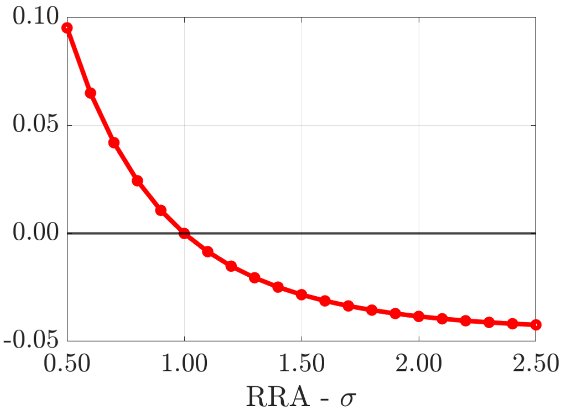
- Applied to ρ_j^i

$$\sigma_\rho = \eta\left[\left(V_1^H - V_1^L\right) - \left(V_2^H - V_2^L\right)\right]$$

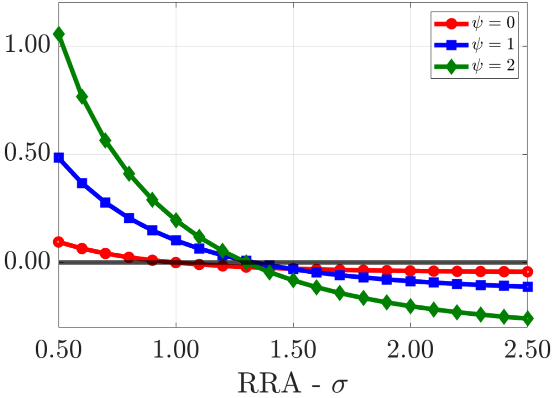
$$\frac{\sigma_\rho}{\eta} \approx \underbrace{\sigma_A u'\left(c_2^L\right) c_2^L}_{\text{Technological comp.}} + \underbrace{-\left(\sigma - 1\right) u'\left(c_1^L\right)\left(y_1^L - y_2^L\right)\Delta \log y_1}_{\text{Wealth effects}} \quad , \quad \Delta \log y_1 = \frac{y_1^H - y_2^H}{y_2^H}.$$

2. Sorting



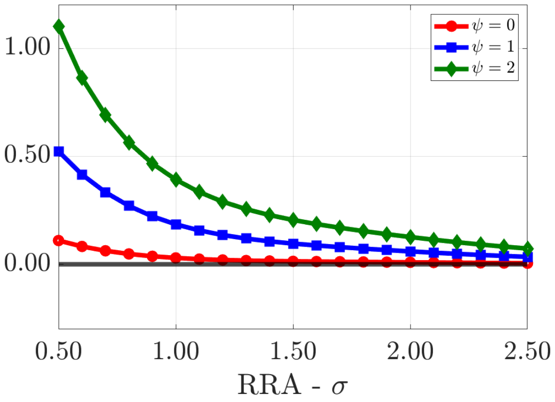
- With $\psi = 0$, sorting is *positive* if and only if $\sigma < 1$
- If $\sigma > 1$, high skill workers have marginally lower value of high wages

2. Sorting



- With $\psi = 1$ and $\psi = 2$, sorting is positive for small $\sigma > 1$
- Production complementarities dominate

2. Sorting



- With non-labor income $b > 0$, workers generally less elastic
- Gives more room for complementarities to dominate

QUANTITATIVE

Static model

- Setup: 10 worker types, 10 firm types. Unearned income b. CRS $(\alpha = 1)$
- Firm productivity: $\log z_j \sim N\left(\log \overline{Z} - \frac{1}{2}\sigma_z^2, \sigma_z\right)$
- Worker productivity: $\log e^i \sim N\left(1 - \frac{1}{2}\sigma_e^2, \sigma_e\right)$
- Market power: η to match average markdown. For now: $\theta = \eta/4$.
- Choose σ_e, σ_z, ψ to target wage decomposition in Kline, Saggio, Sølvsten (2020):

$$\text{Firm fixed effects:} \quad \widehat{\psi}_j = \mathbb{E}\left[\log w_j^i | j\right] \quad , \quad \mathbb{V}\left[\widehat{\psi}_j\right]$$

$$\text{Worker fixed effects:} \quad \widehat{\alpha}^i = \mathbb{E}\left[\log w_j^i | i\right] \quad , \quad \mathbb{V}\left[\widehat{\alpha}^i\right] \quad , \quad \mathbb{C}\left[\widehat{\alpha}^i, \widehat{\psi}_j\right]$$

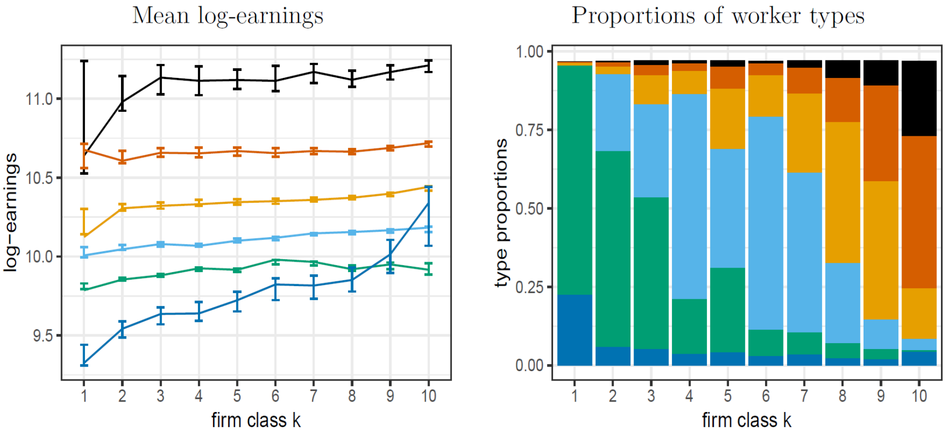
Calibration

Parameter		Value	Moment	Data	Model
Relative risk aversion	σ	1.50			
Frisch elasticity	φ	0.65			
Decreasing returns	α	1.00			
Productivity shifter	$\overline{Z}$	34.99	Average earnings	\$43,800	\$43,791
Labor disutility shifter	$\overline{\varphi}$	9.0×10^6	Average hours	1,770	1,770
Unearned Income	b	\$5,694	13% of labor income (7% of GDP)		
Tax function - Progressivity	τ	0.18	Heathcote et al. (2017)		
Tax function - Shifter	λ	5.56	Tax/GDP	0.20	0.20
Within-market dispersion	η	1,023	Average markdown (employment)	0.75	0.75
Across-market dispersion	θ	205			
Worker prod. dispersion	σ_e	0.458	Variance of worker effects	0.113	0.113
Firm prod. dispersion	σ_z	0.261	Variance of firm effects	0.024	0.024
Complementarity coefficient	ψ	0.0065	Correlation between worker/firm effects	0.283	0.283

Additional moments

Moment	Data	Model	Moment	Data	Model
Employment *HHI*	0.15	0.15	Payroll *HHI*	0.17	0.20
Share of employment in top firm	0.30	0.26	Labor share	0.65	0.73
Firm-size premium	0.10	0.38	Mean Consumption / Income	0.70	0.93
			Payroll-share Markdown elasticity	-0.18	-0.26

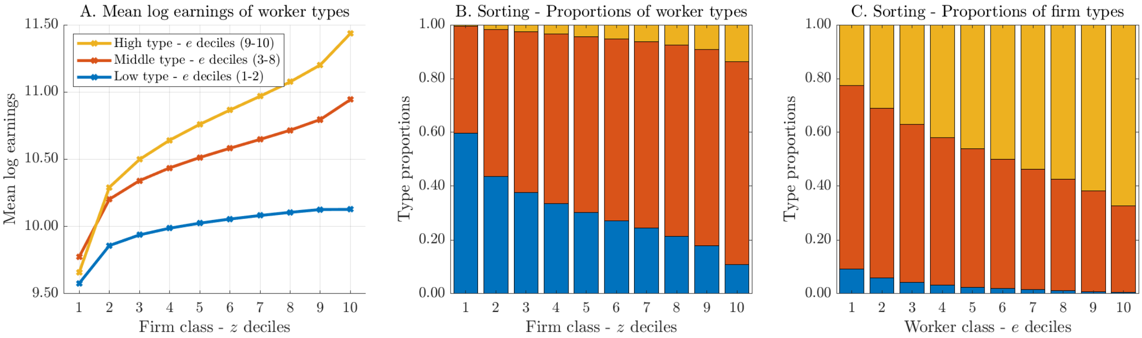
Wages and sorting



A. Roughly log additive structure to wages

B. Sorting of high wage workers to high wage firms

Wages and sorting



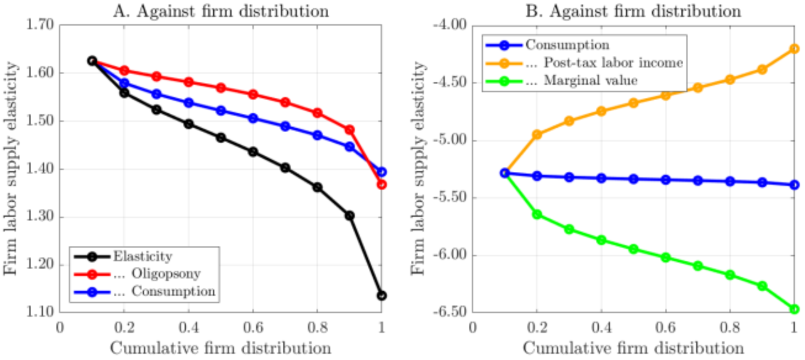
- Broadly consistent with view of the data from BLM
- Additional feature: Sorting viewed from 'firm side', understates the fact that most workers work at high z firms ... large firms employ lots of all types of workers

Firm labor supply elasticities - By worker-firm

	A. Seegmiller (2023)		**B. Model**	
	Low z	High z	Low z	High z
Low skill workers	8.44	5.72	3.96	3.47
High skill workers	1.72	1.07	3.81	2.00

- Elasticties falling within-worker-type, across-firms
  1. Less elastic at higher wages, higher consumption
  2. More 'size-based' market power
  - Contra Volpe (2024): Within-type, elasticities higher at higher productivity firms
- Elasticities falling within-firm, across-worker-types
  - Higher consumption workers, less elastic

Firm labor supply elasticities - At firm level



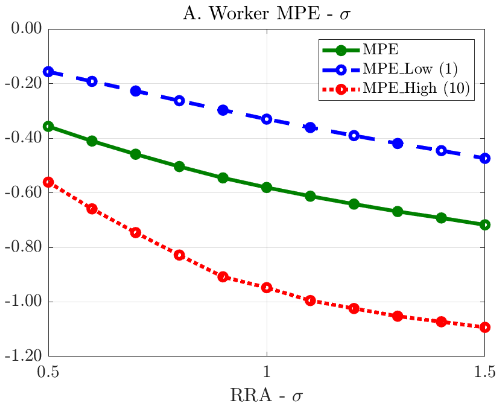
- Larger firms face lower labor supply elasticities
- Now due to both 'oligopsony' and 'consumption'
- With $\sigma = 1.5$, higher post-tax labor income $\uparrow c$ delivers lower $\downarrow u'(c)$ more than 1:1

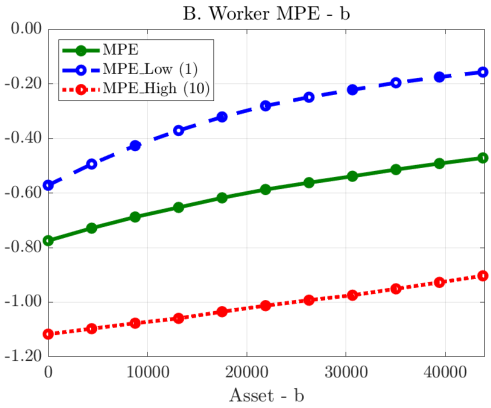
Recent empirical evidence on MPE's

Golosov et al (2021) - *Americans' Response to Idiosyncratic Changes in Unearned Income*

	All	Income group		
GGMN		Q1	Q2-Q3	Q4
MPE	-0.52	-0.31	-0.55	-0.67

Recent empirical evidence on MPE's





- Recalibrate η to match markdown 0.75. Increase b by 10 percent
- Model consistently gets ordering / magnitude of MPE's roughly correct

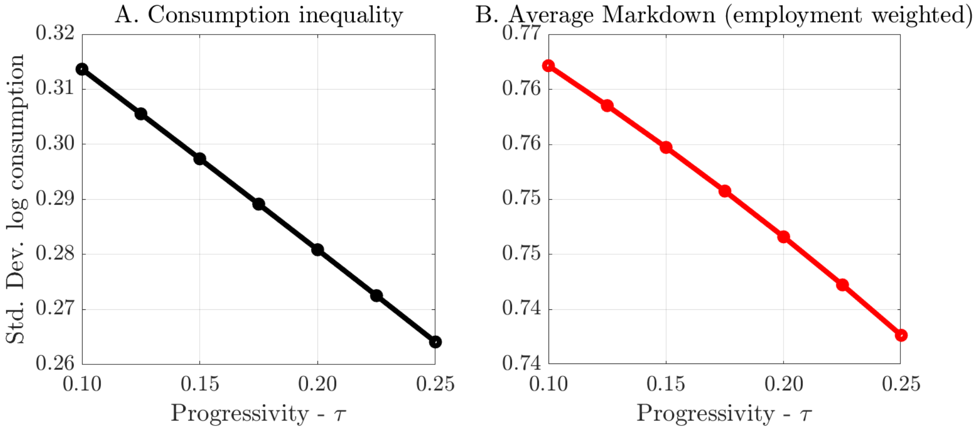
Tax progressivity

- Budget constraint:

$$c_j^i = \lambda \left(w_j^i h_j^i \right)^{1-\tau} + b^i$$

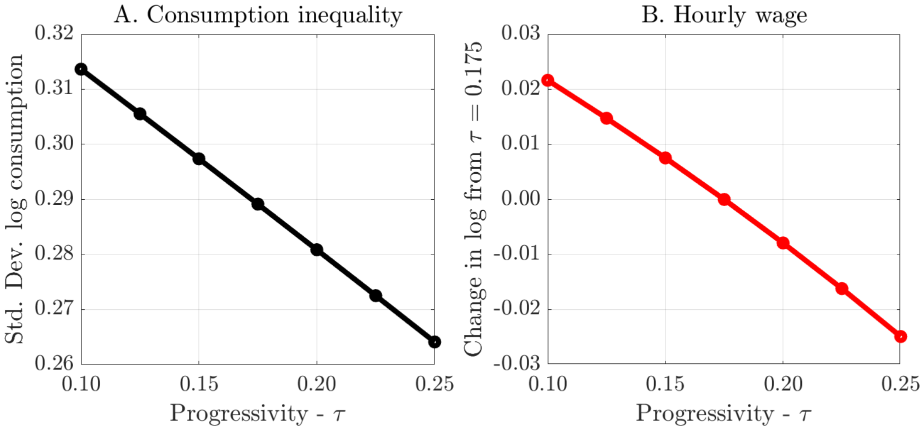
- For each $\tau \in [0, 0.05, ..., 0.25]$ choose λ to keep total T / Y constant
- Outcomes
  - Inequality, Markdowns, Sorting, Output

Progressivity, Inequality, Output



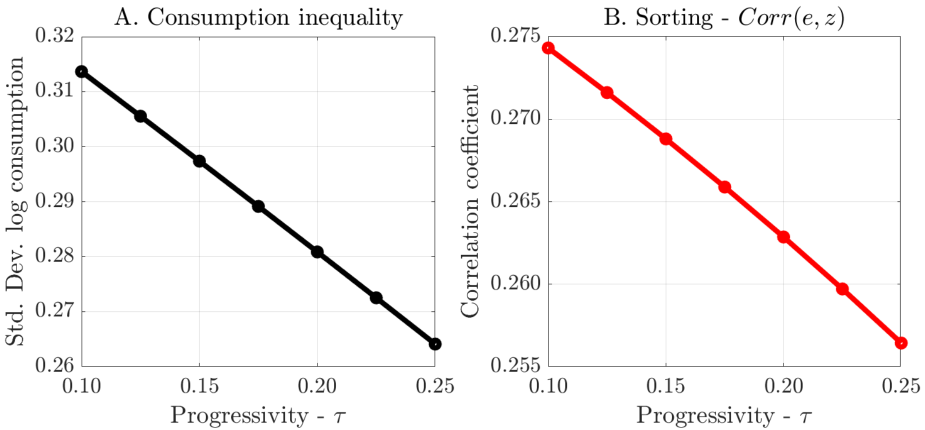
- Reduces consumption inequality
- Widens markdowns

Progressivity, Inequality, Output



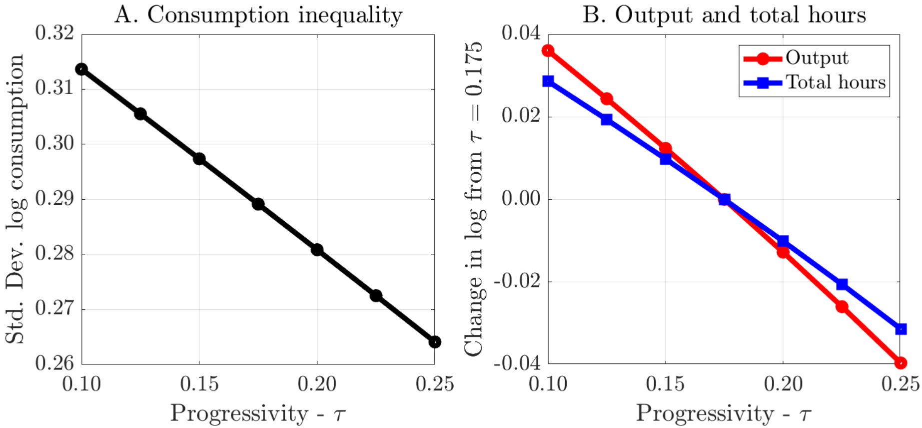
- Reduces consumption inequality
- Wages fall $\rightarrow$ On net its a labor demand shock

Progressivity, Inequality, Output



- Reduces consumption inequality
- Reduces sorting

Progressivity, Inequality, Output



- Reduces consumption inequality
- Lowers output: 75% due to decline in Total hours, 25% due to decline in Labor Productivity

Conclusion

- Unified quantitative theory of consumption, savings, labor supply, labor market power
- Foregrounds interaction between wealth and labor supply elasticities
  - Gets intuition of *poor workers are choosier between jobs*

    ... competitive labor markets for low wage labor, consistent with data
- Going forward
  - Dynamic model + Calibrated to our own moments from LEHD data
  - Calibration to heterogeneous markets - BHM (AER, 2022)
  - Compare implications for MPE's / MPC's to recent estimates - Golosov et al (QJE, 2024)
  - Revisit policy counterfactuals - E.g. Mergers, Minimum wages

APPENDIX SLIDES

Tax progressivity in simplified BHM economy (BHMM, AEA P&P, 2024)

- Household

$$\max_{C,\{n_j\}} \quad \log\left(C - \frac{\mathcal{N}^{1+1/\varphi}}{1+1/\varphi}\right) \quad , \quad \mathcal{N} = \left[\int n_j^{\frac{\eta+1}{\eta}} dj\right]^{\frac{\eta}{\eta+1}}$$

subject to

$$C = \sum_j \left(1-\tau_0\right)\left(w_j\right)^{1-\tau_1} n_j + \Pi$$

Tax progressivity in simplified BHM economy (BHMM, AEA P&P, 2024)

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- Firm

$$\pi_j = Zn_j - w_j n\left(w_j\right) \quad , \quad n_j = \left(\frac{w_j}{\mathcal{W}}\right)^{\varepsilon}\mathcal{N} \quad , \quad w_j = \frac{\varepsilon}{\varepsilon+1}Z \quad , \quad \varepsilon = \left(1-\tau_1\right)\eta$$

Tax progressivity in simplified BHM economy (BHMM, AEA P&P, 2024)

- Household

$$\max_{C,\{n_j\}} \quad \log\left(C - \frac{\mathcal{N}^{1+1/\varphi}}{1+1/\varphi}\right) \quad , \quad \mathcal{N} = \left[\int n_j^{\frac{\eta+1}{\eta}} dj\right]^{\frac{\eta}{\eta+1}}$$

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- Firm

$$\pi_j = Zn_j - w_j n(w_j) \quad , \quad n_j = \left(\frac{w_j}{\mathcal{W}}\right)^{\varepsilon}\mathcal{N} \quad , \quad w_j = \frac{\varepsilon}{\varepsilon+1}Z \quad , \quad \varepsilon = \left(1-\tau_1\right)\eta$$

∗ Additional distortion of progressive taxes

$$\mu = \frac{\left(1-\tau_1\right)\eta}{\left(1-\tau_1\right)\eta+1} \quad , \quad Y = \underbrace{\left[\frac{(1-\tau_1)\,\eta}{(1-\tau_1)\,\eta+1}\right]^{\varphi(1-\tau_1)}}_{\text{Monopsony term}} \times \underbrace{\left[\left(1-\tau_0\right)^{\varphi} Z^{1+\varphi(1-\tau_1)}\right]}_{\text{Competitive distortion, } W=Z}$$

3. Pass-through - $\varphi(w_j)$

Rich literature understanding *pass-through* of productivity to wages

- Why? In competitive markets, then 1:1
- Simplified: (i) No intensive margin labor supply $h_{ij} = \overline{h}$, (ii) Constant tax $(\tau_1 = 0)$

Pass-through and *Super-elasticity* of labor supply to the firm

- We would measure change in wage relative to output-per-worker E.g. KPWZ (QJE, 2018)

$$w_j = \alpha \, \mu_j \, (y_j / n_j)$$

$$\frac{\partial \log w_j}{\partial \log(y_j / n_j)} = \frac{[\varepsilon_j + 1]}{[\varepsilon_j + 1] - \mathcal{E}_j}$$

$$\mathcal{E}_j = \frac{\partial \log \varepsilon_j}{\partial \log w_j}$$

- BHM (2022) - Higher wage, Higher market share, Less elastic: $\mathcal{E}_j < 0$, $\varphi_j < 1$

3. Pass-through - $\varphi(w_j)$

Elasticity

$$\varepsilon_j = \int s_{ij}\varepsilon^{\rho}_{ij} di \quad , \quad s_{ij} = \frac{\rho_{ij} e_i}{n_j} \quad , \quad \varepsilon^{\rho}_{ij} = \Big(\rho_{ij}\theta + (1-\rho_{ij})\eta\Big) u'(c_{ij}) e_i w_j$$

Super-elasticity

$$\frac{\partial \log \varepsilon_j}{\partial \log w_j} = \underbrace{-\Big(\eta - \theta\Big) w_j \mathbb{E}_{s\varepsilon}\Big[\rho_{ij} u'(c_{ij}) e_i\Big]}_{\text{1. Market power}} \underbrace{+1 - \sigma \mathbb{E}_{s\varepsilon}\left[mpc_{ij} \times \left(\frac{w_j e_i}{c_{ij}}\right)\right]}_{\text{2. Individual elasticity}} \underbrace{+ \frac{\mathbb{V}_s[\varepsilon_{ij}]}{\mathbb{E}_s[\varepsilon_{ij}]}}_{\text{3. Composition}}$$

Proposition 3 - *Pass-through is ambiguous*

(-) Raise wage, Raise market share, Lowers elasticity

(-) Raise wage, Raise consumption, Lowers elasticity

(+) Raise wage, Workers you hire on the margin are more elastic, Raises elasticity

Consistent with recent empirical evidence on MPE's and MPC's

Golosov et al (2021) - *Americans' Response to Idiosyncratic Changes in Unearned Income*

- In the model, the *marginal propensity to earn* is dy_i / db_i

$$MPE_i = -\frac{\varphi\sigma}{1+\varphi\tau_1} \times \frac{MPC_i}{APC_i}$$

	All	Income group		
GGMN		Q1	Q2-Q3	Q4
MPE	-0.52	-0.31	-0.55	-0.67
MPC	0.58	0.73	0.54	0.50

- Given $\sigma = 1.50$ and $\tau_1 = 0.186$ (HVS, 2020), average estimates imply $\varphi = 0.45$
- Fix $r = 0.02$ and calibrate β to match estimates of MPC_i
- Declining APC_i with income, delivers higher MPE_i with income